AF/2700 #15 8-8-03

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of — Atty. Docket

ANTONIUS C. KALKER ET AL. — PHN 17,025

Serial No.: 09/348,891 — Group Art Unit: 2615

Filed: July 6, 1999 — Examiner: T.Q. Tran

Title: DETECTION OF A WATERMARK IN A COMPRESSED VIDEO SIGNAL

AHC 8/05/03

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Enclosed is an original plus two copies of an Appeal Brief in the above-identified patent application.

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Respectfully submitted,

By _____
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On June 25, 2003
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By Burnett James
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Sir:

BRIEF FOR APPELLANTS

This is an appeal from the Examiner of Group 2615 finally rejecting claims 1-6 in this application.

(1) Real Party in Interest

The real party in interest in this application is U.S. PHILIPS CORPORATION by virtue of an assignment from the inventors recorded on July 6, 1999, at Reel 10091 Frames 0192-0193.

(2) Related Appeals and Interferences

There are no other appeals or interferences related to this application.

(3) Status of the Claims

Claims 1-6 stand finally rejected by the Examiner.

(4) Status of Amendments

There was one (1) Response filed on February 24, 2003, after final rejection of the claims on January 29, 2003, which was considered by the Examiner.

(5) Summary Of The Invention

A watermark is often embedded in a video signal by slightly modifying the luminance pixels of the video signal in accordance with a watermark pattern. The subject invention addresses the problem of detecting a watermark in a compressed video signal (e.g., MPEG compression). While a straightforward approach would be to decode the MPEG signal and then apply the decoded MPEG signal to a conventional watermark detector, in the case of, for example, a DVD drive for a computer, this straightforward approach entails unnecessary expense for the MPEG decoder when this may not be needed, i.e., all that is needed is to determine whether the video program is watermarked.

With the above in mind, the subject invention, as shown in Fig. 1 and described in the Substitute Specification on page 5, line 24 to page 7, line 19 (paragraphs [0015] to [0019]), a variable length decoder 1 decodes the codewords representing the coefficients in the MPEG signal. These coefficients are then

accumulated in a buffer 3. The accumulated coefficients are then subjected to an inverse transformation in iDCT 5, thereby transforming the accumulated coefficients into the spatial domain. The now accumulated spatial "picture" is then applied to a conventional watermark detection circuit 6. U.S. Patent 5,933,798 is cited in the Substitute Specification on page 2, paragraph [0004], as an example of such a conventional watermark detector.

(6) Issues

Whether the invention, as claimed in claims 1-6, is anticipated, under 35 U.S.C. 102(e), by U.S. Patent 6,278,792 to Cox et al.

(7) Grouping Of Claims

Appellants assert that claims 1-6 stand and fall together.

(8) Arguments

The Cox et al. patent discloses a robust digital watermarking in which a watermark to be embedded in a picture is a vector W[k], k=1…N. The watermark is embedded in the DCT domain. To this end, an equally long vector V[k] is extracted from the picture. More particularly, the DCT coefficients of the picture are classified into N sets. A weighted sum of the coefficients of set 1 constitutes V[1], a weighted sum of the coefficients of set 2

constitutes V[2], etc. The picture is modified such that its vector V[k], k=1…N, has a high correlation with W[k].

The watermark detection is shown in Fig. 8 and described in Cox et al. at col. 12, line 12 to col. 13, line 8. The detector receives an MPEG stream. The stream is Huffman decoded (80) so that the DCT coefficients are available. The coefficients are classified as described above and summed in an accumulator (82) to obtain a vector having length N. This vector is then correlated (84) with the watermark W[k] to be detected.

In the Office Action mailed January 29, 2003, the Examiner, in rejecting the claims, states:

> "Regarding claim 1, Cox et al discloses a method of detecting a watermark in a compressed video signal (Fig. 10) comprising spectral coefficients obtained by transforming picture of said video signal, the method comprising the steps:
>
> "accumulating spatially corresponding coefficients of a plurality of picture (step 102 of Fig. 10, col. 17, lines 51-58);
>
> "inverse transforming said accumulated coefficients into an accumulated plurality of pictures (step 104 of Fig. 10, col. 17, line 59 to col. 18, line 1); and
>
> "detecting the watermark in said accumulated plurality of pictures (steps 106-118 of Fig. 10, col. 18, lines 1-12)."

Appellants submit that the Examiner is mistaken. In particular, Fig. 10 of Cox et al. relates to detection of a watermark **in a picture that has been subjected to an unknown offset in the horizontal and/or vertical direction.** To this end, a specific registration pattern is embedded in the picture. As noted by Cox et al. at col. 17, lines 51-53: "With reference now to FIGS.

10 and 11, there are shown the basic detection algorithms modified to compensate for translational registration." The process shown in Fig. 10, comprises four distinctive phases:

1. Detection of the registration pattern (accumulation in the DCT domain 102, inverse transformation into the spatial domain 104, accumulation in the spatial domain 106) (col. 17, line 53 to col. 18, line 2);

2. Compensation of the offset based on the registration pattern in the spatial domain (108) (col. 18, lines 2-5);

3. Accumulation in the spatial domain (110), and transforming the picture to the DCT domain (112) (col. 18, lines 5-7); and

4. Accumulation in the DCT domain (114), watermark extraction in the DCT domain (116), and watermark detection in the DCT domain (118) (col. 18, lines 7-17).

It should be noted that Cox et al. specifically refers to the described watermark detection with reference to Fig. 8, i.e., watermark detection in the DCT domain.

In the subject invention, as claimed in claims 1, 4 and 6, a compressed video signal is defined as containing spectral coefficients obtained by transforming pictures of the video signal. It should as such be understood that this compressed video signal is in the transform domain (e.g., "discrete cosine transform" (DCT) domain). The subject invention, as claimed, then accumulates spatially corresponding coefficients of a plurality of pictures. In a subsequent step, the accumulated coefficients are inverse

transformed into an accumulated plurality of pictures. As opposed to the transform domain, this accumulated plurality of pictures is in the spatial domain as a result of the inverse transforming of the accumulated coefficients in the transform domain. Finally, the watermark is detected in this accumulated plurality of pictures (i.e., in the spatial domain). This is supported in the specification as filed on page 4, lines 27-31, where it specifically states "the accumulated result is applied to the DCT circuit 5 in which it is inverse transformed into the spatial domain. The accumulated spatial "picture" P is then applied to the conventional watermark detection circuit 6."

In the Advisory Action mailed May 7, 2003, in response to Appellants' arguments, the Examiner states:

> "First of all, it is noted that the MPEG as shown in Fig. 2 of Cox et al has two domains, spatial domain and DCT domain. It is noted that the MPEG of Cox et al. comprising spectral coefficients obtained by transforming pictures of said video signal as recited in the preamble of claim 1.
>
> "Secondly, the limitation '**inverse transforming** said accumulated coefficients into an accumulated plurality of pictures' recited in claim 1 can be **inverse transforming from DCT domain to spatial domain** or can be **inverse transforming from spatial domain to DCT domain.** Accordingly, one skilled in the art **would not known** from the limitation '**inverse transforming** said accumulated coefficients into an accumulated plurality of pictures' recited in claim 1 that the detecting watermarks in the spatial domain **because MPEG of Cox et al has two domains, DCT domain and spatial domain.**"

Appellants submit that it should be clear from the Examiner's analysis that the Examiner is looking at specific terms in the

claims and taking them out of context. It is well known and common knowledge to those skilled in the art that a signal in the spatial domain is "transformed" to the transform domain (discrete cosine transform DCT domain), while a signal in the transform domain is "inverse transformed" to the spatial domain. Further, when, for example, claim 1 is taken as a whole, it becomes clear that the compressed video signal having the spectral coefficients is in the transform domain and that these coefficients are accumulated and the accumulation is inverse transformed into the spatial domain.

The Examiner's statements that MPEG of Cox et al. has two domains does not make any sense. At no time in Cox et al. is it described that the MPEG signal is in both the spatial and transform domains. Rather, the MPEG signal is in either the spatial domain or the transform domain, depending upon what processing is being performed on the MPEG signal.

In particular, Fig. 10 of Cox et al. states quite clearly which domain is being processed in each stage: the accumulation in step 102 is in the DCT domain; this accumulation is inverse transformed in step 104 to the spatial domain; the accumulation in step 106 is in the spatial domain; the accumulation in step 110 is in the spatial domain; this accumulation is converted, in step 112, to the DCT domain; and the accumulation in step 114 is in the DCT domain. Hence, the watermark extraction/detection of steps 116 and 118 is in the DCT domain. As such, even Cox et al. acknowledges that an "inverse transform" process goes from the DCT (transform)

domain to the spatial domain, while a "transform" process goes from the spatial domain to the DCT (transform) domain.

Finally, the Examiner states that the claimed "inverse transforming said accumulated coefficients into an accumulated plurality of pictures" is anticipated by step 112 of Fig. 10 of Cox et al.

Appellants submit that this statement is incredulous. First, Cox et al. clearly shows that their step of "inverse transforming" is performed in step 104, not step 112. Second, nowhere have Appellants indicated that Appellants invented the process of inverse transformation. Rather, Appellants invention is the combination of the steps of claim 1 and the means of claims 4 and 6 which enable the detection of a watermark in a compressed video signal, in which the watermark detection is carried out in the spatial domain.

(9) Conclusion

Based on the above arguments, Appellants believe that the subject invention is not anticipated by the prior art and is patentable thereover. Therefore, Appellants respectfully request that this Board reverse the decision of the Examiner and allow this application to pass on to issue.

Respectfully submitted,

by _____
Edward W. Goodman, Reg. 28,613
Attorney

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On June 25, 2003

By Burnett James

(10) Appendix

CLAIMS ON APPEAL

1. (Amended) A method of detecting a watermark in a compressed video signal comprising spectral coefficients obtained by transforming pictures of said video signal; the method comprising the steps:

accumulating spatially corresponding coefficients of a plurality of pictures;

inverse transforming said accumulated coefficients into an accumulated plurality of pictures; and

detecting the watermark in said accumulated plurality of pictures.

2. (Amended) The method as claimed in claim 1, wherein said encoded video signal includes predictively encoded pictures each comprising coefficients representing a residual picture after subtracting a prediction picture, and wherein the step of accumulating coefficients is applied to the coefficients representing said residual pictures irrespective of coefficients representing the prediction picture.

3. (Amended) The method as claimed in claim 2, wherein said predictively encoded pictures further include motion vectors, and

wherein the step of accumulating coefficients is carried out irrespective of said motion vectors.

4. (Amended) An arrangement for detecting a watermark in a compressed video signal comprising spectral coefficients obtained by transforming pictures of said video signal, the arrangement comprising:

means for accumulating spatially corresponding coefficients of a plurality of pictures;

means for inverse transforming said accumulated coefficients into an accumulated plurality of pictures; and

means for detecting the watermark in said accumulated plurality of pictures.

5. (Amended) An arrangement for decoding a compressed video signal comprising spectral coefficients obtained by transforming pictures of said video signal, the arrangement comprising:

means for accumulating spatially corresponding coefficients of a plurality of pictures; and

means for inverse transforming said accumulated coefficients into an accumulated plurality of pictures.

6. (Amended) A device for recording and/or playing back a compressed video signal, said device comprising means for disabling recording and/or playback of the video signal in dependence upon

the presence of a watermark in said video signal, characterized in that the device comprises an arrangement for detecting said watermark in the video signal, said arrangement comprising:

means for accumulating spatially corresponding coefficients of a plurality of pictures;

means for inverse transforming said accumulated coefficients into an accumulated plurality of pictures; and

means for detecting the watermark in said accumulated plurality of pictures.